FOREST RESEARCH NEWS FOR THE MIDSOUTH

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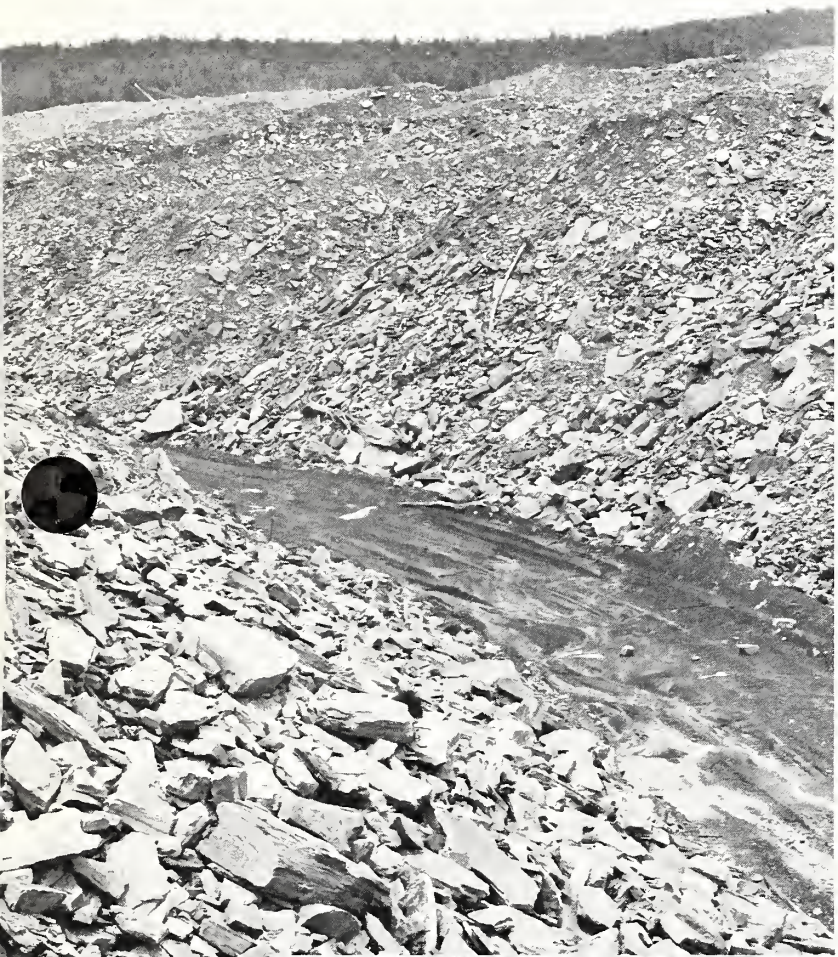
SOUTHERN FOREST EXPERIMENT STATION, FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE

New Hope For Reclaiming Spoil Banks



An industry's success in direct-seeding spoil banks brings new hope for reclaiming barren, rocky slopes left by strip-mining. By applying research findings of the Southern Forest Experiment Station, U. S. Steel Corporation has successfully direct-seeded pines on strip-mined land in northern Alabama, regenerating steep, rocky, difficult-to-plant areas at a cost far below that of planting pine seedlings.

Seeds were sown from the air. Aerial sowing of seeds coated with chemicals to ward off predators is a method originally developed to reforest logged areas in the South. First to employ the technique on the huge banks of overturned earth that have long been of deep concern to conservationists, U. S. Steel achieved excellent results at about one-fifth the cost of planting seedlings.

Chances for a profit from timber restored to strip-mined areas should provide landowners with an incentive to make the land useful with a minimum of delay.

Steep, racky slapes left after mining are expensive and difficult to plant, but pines can be established an them by seeding. Tiny seedlings usually get enaugh maisture ta survive fram crevices between racks.

A 1964 seeding of loblolly pine wos only moderotely successful compored to 1968 results, but in o few yeors the crowns of these trees will close ond the site will be protected.

David Hampe, chief forester in U. S. Steel's Southern District, is probably most responsible for adapting direct-seeding to strip mines. He is completely sold on the method. In 1959 he seeded loblolly pine on a small area of strip-mine banks. It worked. The trees are growing as fast as loblolly pine on undisturbed areas nearby and will be between 70 and 80 feet tall at age 50. He hired a helicopter to sow more than 2,000 acres in the fall of 1967 and spring of 1968. Loblolly, slash, longleaf, and Virginia pines were successful.

Spoil banks are made up almost entirely of shale. Men find it hard to get around on the steep, rocky slopes. Also, it is very difficult in shale to dig 8-inch-deep holes required for planting pine seedlings and then close them enough to prevent roots from drying. Seeds broadcast on the surface come to rest in crevices between the rocks and grow where no man could have successfully planted a seedling. In such places the roots find moisture because the rocks slow evaporation.

Foresters have hoped for a long time to restore forests by broadcasting seed. But seeds were gobbled up almost as fast as they were sown. In 1957 Southern Station scientists at Alexandria, Louisiana, developed a successful bird-insect-rodent repellent, and since then more than 1 million acres have been direct-seeded to southern pines. The savings over planting have been conservatively estimated at about $10 million. Equally important, pine forests have been established on many areas that would have been almost impossible to plant, such as rough terrain difficult to reach with planting machines, areas too wet to be accessible during planting season—and th steep, slippery shale of the sp banks.

Do You Know Fannie or Tessie?

Fannie Frontalis is destructive and mighty unpopular. And Tessie Terebrans is no friend of foresters either. But the Southern Station's booklets about Fannie and Tessie are in great demand.

Though smaller than a grain of rice, Fannie is the most feared insect in southern forests. Widely known as the southern pine beetle, her scientific name is *Dendroctonus frontalis*. Populations can increase to epidemic proportions in very short time, and the loss in a major outbreak can be appalling. During a single epidemic in Honduras during 1962-1964, about 10 billion board feet of pine timber were destroyed. The average annual toll in the U. S. exceeds 100 billion board feet. Fannie is especially dangerous when pines have been weakened by drought, flooding, windstorm, or fire. And she loves neglected, overdense stands where trees are growing slowly. Between epidemics Fannie virtually disappears.

Tessie, whose scientific name is *Dendroctonus terebrans,* is commonly known as the black turpentine beetle. She is larger than Fannie—about half the length of a fingernail. She doesn't make herself known with flashy outbreaks, and for quite a while nobody paid much attention to her. Then, after World War II, foresters found widespread damage from Tessie and her broods. Right now the damage is not as widespread as it was a few years ago. Why? Researchers don't know. Maybe there are population trends or cycles.

This is Fannie Frontalis. Your dying pines may have met her.

FANNIE QUIET NOW

Southern Station scientist William H. Bennett reports that Fannie is also relatively quiet at present, but there is no way of knowing when she may bounce back. "Apparently the severe heat and prolonged drought last summer reduced the bark beetle population in many areas," he says. So far, there is no evidence of a build-up in the trees blown down by Hurricane Camille, though the USDA Forest Service and State forestry commissions urge land managers to complete their salvage as soon as possible. Fannie finds damaged trees inviting.

Ips bark beetles, different from Fannie and Tessie, have invaded nearly all the timber downed by Camille, Bennett said. "Forest Service insect and disease control personnel are watching the situation closely and hope that winter's soaking rains will check the Ips and prevent their moving to nearby standing trees next summer." Many of the standing trees are root-sprung—their roots on one side were broken by strong winds blowing the trees over but not entirely down. Weakened trees in a stand invite beetle build-up or attack.

Camille of course created a special situation. In ordinary times, preventing attack by both Fannie and Tessie is a matter of managing stands so that the trees remain vigorous and fast-growing. A healthy, well-managed stand minimizes the need for chemical control.

Tessie's presence is nearly always tied to careless logging. Loggers are urged to avoid skinning

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Trees weakened by repeated lagging traffic don't stand a chance! Tessie or Fannie will find them.

Superior Cottonwoods To Be Available

Faster growing cottonwood will be possible with a new strain which offers a 20-percent speed-up for what is already known as one of America's fastest growing trees.

The new strain, consisting of 14 superior clones, has been developed and tested in genetics research at the Southern Hardwoods Laboratory in Stoneville, Mississippi. J. S. McKnight was in charge of the work. Official announcement of the new strain was made recently by Forest Service Chief Edward P. Cliff.

A clone is started with cuttings taken from one selected tree, then expanded by growing additional cuttings from the original ones. All members of a clone thus have the same genetic make-up as the original tree.

Methods for planting and managing cottonwoods were worked out earlier by the Stoneville scientists and are now being widely applied. Long rows of knee-high trees being cultivated during their first year are an increasingly common sight in the Mississippi-Arkansas Delta. Land managers who are already growing cottonwood will incorporate the new, genetically superior material into future programs. The new clones are expected to stimulate additional landowners to begin planting.

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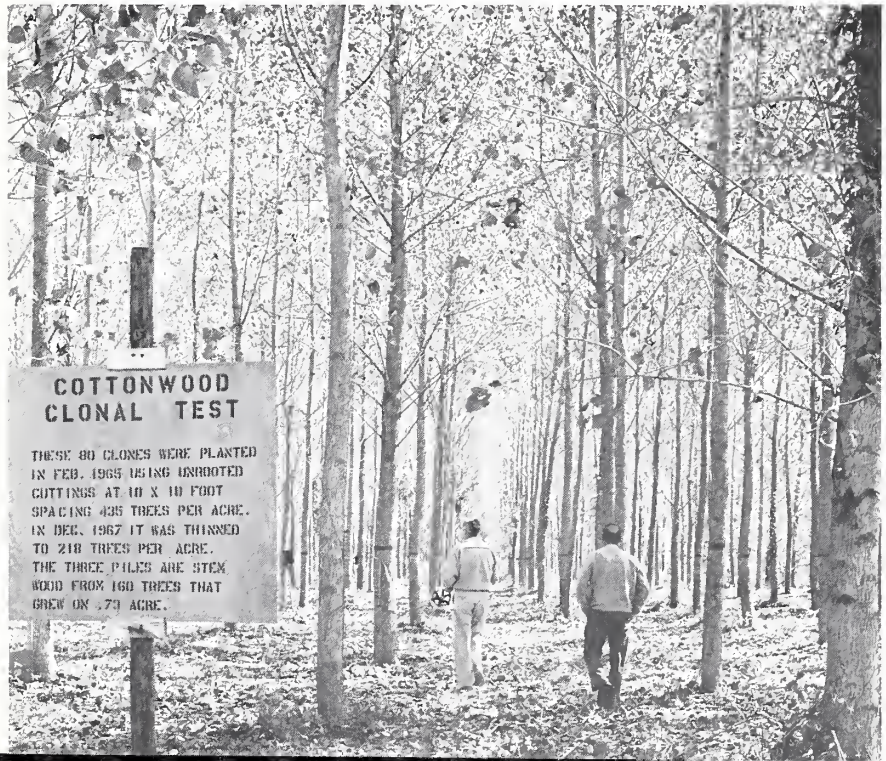

WIDE DEMAND

Demand for cottonwood is rising, but the acreage of natural cottonwood forests is dwindling. The breakthrough is important economically, researchers point out, because cottonwood is used extensively in the manufacture of high-quality magazine paper, furniture and paneling, and boxing and packaging. It is also in wide demand for furniture plywoods, and substitutes well for yellow-poplar. Other items made from cottonwood include excelsior, soft-drink cases, hardboard, insulation board, and wall board.

"On good soil," McKnight explains, "the improved clones should yield 50 cords of pu

wood and more than 24,000 board feet of lumber per acre in years. The trees should grow as much as 8 to 10 feet in height each year until they are about 120 feet tall." Cottonwoods in natural forests grow 4 or 5 feet in height annually, and even at this rate are regarded by many foresters as the country's fastest-growing timber trees.

GOOD FOR SHADE

The new strain will be useful in urban as well as rural forestry when fast-growing trees are wanted for shade and screening. And cottonwood plantations are good habitats for most wildlife.

The Southern Station has transferred the 14 clones to the Forest Service's State and Private Forestry unit at Stoneville. This unit has established a nursery in cooperation with the Delta Branch of the Mississippi Agricultural Experiment Station to multiply the cuttings in the coming year. Clone banks are maintained by the Experiment Station to retain the juvenile characteristics of the superior stock.

Cottonwood responds with increased growth to intensive cultivation. Plantations are cultivated about five times during the first year.

Dr. Carl Mohn, right, Southern Station researcher, explains a 1-year-old clone bank to James McConnell. These young trees will supply the cuttings for clonal expansion.

By the fall of 1971, the nursery clones will have produced an estimated 600,000 cuttings, which will be distributed to interested State and private nurseries in the lower Mississippi Valley. The first commercial planting is expected in the winter of 1972-73.

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As many as seven to eight generations of the southern pine beetle develop each year.

Predicting Fire Behavior

Set a fire to prevent a fire? Doesn't make sense.

It makes sense to forest land managers, who call the fires they set "prescribed burning." There are several reasons for prescribed burning. A big one is to reduce fire hazards by setting a fire when weather and fuel conditions are such that it will burn "cool" enough not to damage trees, but to get rid of burnable litter that might later feed a hot and damaging wildfire.

Fire is fickle, and controlling its behavior during prescribed burns requires real know-how if the objectives are to be attained.

Measuring fuel consumption and fire behavior during hazard-reduction burns was the purpose of a study recently reported by the Southern Forest Fire Laboratory in Macon, Georgia. The timber type was slash-longleaf pine with an understory of palmetto-gallberry that had not been burned for more than 10 years. The pine stand averaged 50 feet in height. On each plot records were made of weather conditions at the time of burning, fuel conditions before and after burning, and the characteristics of the fire itself.

Total fuel reduction was found to be similar for backfires which burn against the wind, and headfires, burning with the wind. Both averaged 55 percent. Backfires, however, consumed more litter fuel (58 vs. 49 percent) and less vegetative fuel (53 vs. 61 percent) than did headfires. Backfires spread slowly and burned deeper into the litter, whereas headfires spread rapidly and often burned only the upper layer of litter.

Rate of spread of backfires was found to be inversely related to the moisture content of the upper layer of litter. The researchers concluded that relative humidity and days since measurable rain may be used to predict the moisture content of the fresh litter or the rate of spread. Wind was not related to the spread of backfires in these tests.

Because the low flames of a backfire lean away from unburned fuel, little preheating of standing vegetation occurs and consumption rates in the aerial portions of the fuel may be low. In a headfire, however, standing vegetation is exposed to considerable preheating and higher flames that consume greater amounts of fuel. A significant difference in fuel reduction between morning and afternoon burns was also shown, with greater fuel consumption in afternoon burns, probably because of lower relative humidity and fuel moisture during those hours.

Complete findings from the tests have been published as USDA Forest Service Research Paper SE-36, "Fuel Consumption and Fire Behavior of Hazard Reduction Burns." Copies are available from the Southeastern Forest Experiment Station at Asheville, North Carolina.

How Dry I Am

A systematic method of estimating progress of drought has long been needed by State and Federal fire control officers. Their experience shows close association between difficult fire suppression and cumulative dryness, or drought.

Often unrecognized in early stages, drought development is not uniformly interpreted. Recent publication of "A Drought Index for Forest Fire Control" by the Southeastern Forest Experiment Station may prove useful to those who have expressed a need for a measure of drought useful in planning fire control operations.

Moisture content of the upper soil, as well as of the covering layer of duff, has an important effect on suppression of forest fire. In certain areas of the U. S. when deep duff fuels are dry, fires burn deeply and with excessive damage. Even relatively small fires are costly. During drought years, normally moist areas which usually serve as good fire barriers become so dry that fires are speeded up instead of slowed by the heavy fuels. Fires also crown more readily under drought conditions, ruining the tree tops.

Purpose of the new index is to provide fire control managers with a continuous scale of reference for estimating deep-drying conditions in areas where the information may be useful in planning fire control operations. A wide range of climatic conditions is covered, making the index as applicable in Ketchikan, Alaska, where the mean annual rainfall is 151.93 inches as it is in Burbank, California, with mean annual rainfall of only 13.88 inches.

The drought index may be computed for any desired level of mean annual rainfall. To simplify computations for field use, the drought factors are presented in five tables, each covering a specified range of mean annual rainfall. The authors, John J. Keetch and George M.

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Wood Structures Resist Camille

Long interested in the effects of high winds on wood structures, Forest Service researchers had ample opportunity to collect evidence when they surveyed damage Hurricane Camille did on August 17, 1969. They found that the intense winds—up to 190 miles an hour—and accompanying 20-foot tidal waves had completely destroyed many structures on the Louisiana and Mississippi Gulf Coasts.

Wood-frame homes exhibited remarkable resistance to the high winds of Camille, which was the most intense hurricane ever to enter the U. S. mainland. Apparently, conventional wood-frame construction in which components are well attached to each other is strong enough to resist the wind forces in hurricane zones. But it takes more than that to withstand the severe tide and wave action along the coastlines during these storms.

These are some of the findings reported by H. F. Zornig, Architectural Engineer of the Southeastern Forest Experiment Station's Forestry Sciences Laboratory at Athens, Georgia, and G. E. Sherwood, Engineer of the Forest Products Laboratory, Madison, Wisconsin.

The report, "Wood Structures Survive Hurricane Camille's Winds," states that a lot of the damage to coastal buildings probably would have been avoided if the buildings had been on pier-type foundations: then the full force of the water could not have hit the buildings directly. This type of foundation would also have greatly reduced property damage from flooding further inland.

Damage from wind appeared to be less for those homes with hip roofs than with gable-end roofs. Most gable roofs that were observed lost more shingles than hip roofs, and had more damage to the sheathing.

Faulty nailing of roof framing to joists was responsible for some of the damage. Rafters should be reinforced with collar beams—boards connecting rafters 2 to 3 feet below the ridge. Roof trusses helped buildings resist Camille's fury, even when masonry walls collapsed.

Although a great many trees were blown down or broken off, in most cases trees spared buildings. Heavy tree cover may actually have reduced the direct wind damage to buildings. In the few cases where fallen trees did hit buildings they did considerable damage.

The authors emphasize that their observations apply only to damage by Camille's record-breaking wind and waves. But they point out that "there is enough similarity in damage caused by hurricanes so that this report will have value in predicting future hurricane damage and can result in better building design for hurricane areas."

Copies of the published report are available on request from the Forest Products Laboratory, Forest Service, USDA, Madison, Wisconsin 53705.

Pier-type foundations are recommended in hurricane areas to avoid damage from high water that accompanies the wind.

Typical new construction in hurricane area has metal anchors tying roof to top plate. Trusses are nailed to top plate with three sixteenpenny nails.

Seaward end of this building felt full force of the tidal wave; the rest of the structure remained intact.

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Of the entire wilderness system now preserved, 60 of the 61 wildernesses are in National Forests.

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Bryan, discuss a method which fire control managers in forested areas can use to estimate the degree of drought. A mathematical description of the overall process is included.

Copies of the new drought index—USDA Forest Service Research Paper SE-38, may be had from the Southeastern Station.

Three other publications also deal with fire control data. One is "The Gaston Fire" by John H. DeCoste, Dale D. Wade, and John E. Deeming—Forest Service Research Paper SE-43. Data on fuel, fire behavior, weather, control activities, and fire effects collected at the 1966 Gaston Fire which burned 7,400 acres in the sandhills near Columbia, South Carolina, are given. Included is an account of the meteorological events which produced the drought and the severe conditions during one of the worst fire periods in South Carolina's history.

Two wildfires which occurred in coastal North Carolina during the same period are subjects of USDA Forest Service Research Paper SE-50, "Unusual Wind Shifts of Two Wildfires," by Dansy T. Williams.

In the Air Force Range Fire changes in the wind were due to the oscillatory passage of a sea breeze front. In the Holly Shelter Fire the changes were due to passages of a pressure trough line and a sea breeze front, and the partial passage, retreat, and final passage of a surface cold front. Retreat of the cold front may have resulted from heat added to its leading edge by the fire itself.

When is it a good idea to "fight fire with fire"? USDA Forest Service Research Note SE-102 describes situations when suppression firing—setting a fire to check a fire—is recommended and conditions when the method should NOT be used. Title of this one is "Preliminary Guidelines for Using Suppression Fires to Control Wildfires in the Southeast."

These publications also are available on request from the Southeastern Forest Experiment Station, P. O. Box 2570, Asheville, North Carolina 28802.

Forest Survey Tries Contract Cruising

The Forest Survey Unit of the Southern Station has become the first such unit in the country to employ "contract cruising" for obtaining forest inventory data. Private forestry consultants are being used on an experimental basis in three counties in the Arkansas Ozarks—Madison, Johnson, and Newton. Contractors began field work in early February.

Charged with collecting, compiling, analyzing, and publishing information on more than 100 million acres of commercial timberland in the South Central States, the Forest Survey reinventories the changing resource situation in each State every 10 years. The goal is to resurvey every 8 years.

Manpower problems have made it difficult to maintain a schedule. Project Leader Joe F. Christopher thinks contract cruising, if successful, may begin a new trend in resource inventories. Already other Survey units have expressed interest in using the same approach, he said. The Forest Survey Unit maintains quality control by frequent inspections.

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the bark on standing trees, compacting the soil or crushing the roots with heavy equipment. While Tessie prefers fresh-cut stumps, like Fannie, she is attracted by damaged or unhealthy trees. She will move to living trees weakened by careless logging, or where road building and logging have disturbed the stand, causing flooding or otherwise altering the water table. "If logging damage is minimized and common sense practiced in avoiding stand disturbance, chemical control of the insect usually is unnecessary," Bennett said.

The Southern Station Booklets, "This Is Fannie Frontalis" and "The Truth About Tessie Terebrans," illustrate with cartoons these dangerous gals at work in southern pines. They stress in easy-to-understand drawings how build-ups or attacks can be prevented. Both booklets, by Bennett and H. Eugene Ostmark, are available from the Southern Station. Since Fannie is no respecter of language and is found as far south as Honduras, the booklets also have been printed in Spanish.

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Output of industrial wood products from Midsouth States has increased by more than one-half since 1963.

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